Tribhuvan University

Bachelor of Science in Computer Science and Information Technology

Model Question

**FM. = 60**   **Hr. = 3 hr**

PM. = 24

Introduction to Artificial Intelligence

1. Is it possible to make a computer that think like human brain until up to now? Justify with proper reason. What is the purpose of Turing test? Describe it in detail.
2. What is meant by admissible heuristic? Give example of admissible heuristic. What improvement is done in A* search than Greedy Search? Prove that A* search gives us optimal solution if the heuristic function is admissible.
3. What is the purpose of utility value in game search? Consider the following game tree (drown from the point of view of the Maximizing player):
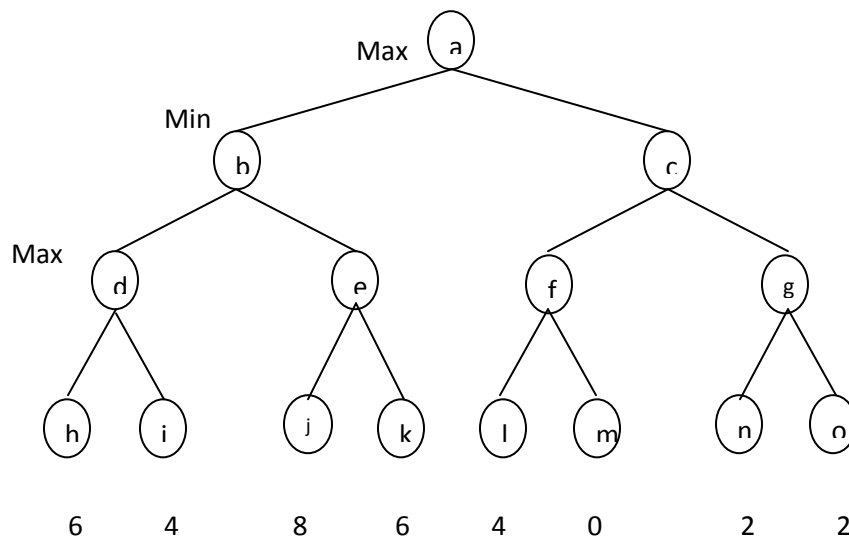
Use the mini-max procedures and show what moves should be chosen by the two players. Use the alpha-beta pruning procedure and show what nodes would not need to be examined.

4. What is meant by complete and soundness property of inference algorithm? Consider the knowledge base given as below:
$(P \Leftrightarrow (P \lor Q)) \land \neg P$
Prove that $\neg Q$ can be inferred from above KB by using resolution.
5. What is standardizing apart? Convert the following statements into FOPL
All over smart person's are stupid

Children's of all stupid persons are naughty

Ram is children of Hari

Hari is over smart

Prove that Ram is naughty by using Backward Chaining

6. Describe role of domain expert, Knowledge engineer and programmer in SDLC of expert system. Explain the features of expert system.

7. What is the difference between symbolic and non-symbolic AI? Represent the following knowledge in semantic network

Robin is bird

Clyde is a Robin

Clyde owns a nest from spring 2010 to fall 2010

8. What is machine learning? Explain the learning from Analogy and Instance based learning.

9. What is Constraint satisfaction problem? Give an example of constraint satisfaction problem. Consider the following a production system characterized by

- Initial short term memory: C5, C1, C3
- Production rules: C1 & C2 $\rightarrow$ C4

  C3 $\rightarrow$ C2

  C1 & C3 $\rightarrow$ C6

  C4 $\rightarrow$ C6

  C5 $\rightarrow$ C1

Show a possible sequence of two recognize-art cycles. Which will be the new content of the short-term memory after these two cycles?

10. What is Bayesian network? Explain how Bayesian network represent and inference the uncertain knowledge.

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Bachelor Level/ Third Year/ Fifth Semester/Science   Full Marks: 60
Computer Science and Information Technology   Pass Marks: 24
(CSc. 304 – Artificial Intelligence)   Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
The questions carry equal marks.
Attempt all questions.

1. Define an artificial intelligence (AI). Explain the behaviors of the AI. What do you mean by Turing test? Explain it.
2. Why disjunctive normal form is required? Explain all the steps with examples.
3. "A person born in Nepal, each of whose parents is a Nepali citizen by birth, is a Nepali citizen by birth. A person born outside Nepal, one of whose parents is a Nepali citizen by birth, is a Nepali citizen by descent. Several developed countries have dual citizenship provision, but Nepal doesn't have that provision". Represent the above sentences in first order predicate logic and explain each step.
4. Differentiate between inference and reasoning. Why probabilistic reasoning in important in the AI? Explain with an example.
5. Justify that searching is one of the important part of AI. Explain in detail about depth first search and breadth first search techniques with an example.
6. Define learning. Why learning frame work is required? Explain about learning frame work with block diagram and examples.
7. What is a Bayes's theorem? Explain its applications.
8. What is a back propagation? Explain all the steps involved in the back propagation with an example.
9. How can you construct expert system? Explain knowledge engineering with an block diagram.
10. Define a natural language processing. Explain the different issues involved in the natural language processing.

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The questions carry equal marks.

Attempt all questions. (10x6=60)

1. What is Artificial Intelligence (AI)? Describe your own criteria for computer program to be considered intelligent.
2. For each of the following agents, determine what type of agent architecture is most appropriate (i.e. table lookup, simple reflex, goal-based or utility-based).
    a. Medical diagnosis system
    b. Satellite image analysis system
    c. Part-pricking robot
    d. Refinery controller
3. What is state space representation of problem? Represent the root finding problem having four cities in to state space representation (you can choose any ordering of cities and links) and devise the complete problem formulation.
4. What is heuristic information? Suppose that we run a greedy search algorithm with h(n)-g(n) and h(n)=g(n). What sort of search will the greedy search follow in each case?
5. State whether the following sentences are valid, unsatisfiable, or neither.
    a. Smoke => Smoke
    b. Smoke => Fire
    c. (Smoke => Fire) => (~Smoke => ~Fire)
    d. Smoke V Fire V ~Fire
6. Consider the knowledge base:
    "If it is hot and humid, then it is raining. If it is humid, then it is hot. It is humid"
    a. Describe a set of propositional letters which can be used to represent the knowledge base.
    b. Translate the KB into propositional letters using your propositional letters from part a.
    c. Is it raining? Answer this question by using logical inference rules with the KB.
7. What do you mean by knowledge representation? Explain the characteristic of representation.
8. Define the Model-Based and Cased Based system. Discuss which system is suitable for the following problems.
    a. Electronic Circuit Testing
    b. Legal Reasoning
    c. Disease Recognition
9. What is Bayes' rule? Discuss the use of Bayes' rule for uncertain reasoning.
10. After your yearly checkup, the doctor has bad news and good news. The bad news is that you tested positive for a serious disease, and the test is 99% accurate (i.e. the probability of testing positive given that you have the disease is 0.99, as is the probability of testing negative if you don't have the disease). The good news is that this is a rare disease, striking only one in 10,000 people.
    a. Why is it good news that the disease is rare?
    b. What are the chances that you actually have the disease?